DOCUMENT RESUME

ED 411 820 IR 056 647

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TITLE Internet in the Indian Context.
PUB DATE 1996-00-00
NOTE 9p.; In: Online Information 96. Proceedings of the International Online Information Meeting (20th, Olympia 2, London, England, United Kingdom, December 3-5, 1996); see IR 056 631.
PUB TYPE Reports - Descriptive (141) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Access to Information; Computer Networks; Foreign Countries; *Information Services; Information Technology; *International Organizations; *Internet; *Online Vendors; Organizations (Groups); Systems Development; Technological Advancement
IDENTIFIERS *India; Technological Infrastructure

ABSTRACT

This paper presents briefly the concept of the Internet and lists the Internet service providers in India (Education and Research Network from Department of Electronics, National Informatics Network from National Informatics Center, Gateway Internet Access Service from Videsh Sanchar Nigam Limited, and SOFTNET from Software Technology Parks India) with their objectives, services and tariff. It discusses the preparedness of India to join the information superhighway by mentioning the activities of various organizations, grouping them broadly under business, directories, investment, newspapers, online information, religious, tourism, exhibitions/conferences, software products and campaign. Discussion then moves to the limitations to Internet access in India by way of infrastructure with limitations on leased lines, expensive hourly usage costs due to lack of tie-ups with Internet companies and gauging the popularity of World Wide Web sites. The paper concludes that the booming Indian information technology market trend encourages the Internet service providers to expand and Internet awareness is on the rise through various seminars/workshops coupled with live demonstrations. (Contains 14 references.) (Author/AEF)

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Internet in the Indian Context

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Internet in the Indian context

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Abstract: *Presents briefly the concept of the Internet and lists the Internet service providers in India viz., Education and Research Network from Department of Electronics, National Informatics Network from National Informatics Centre, Gateway Internet Access Service from Videsh Sanchar Nigam Limited, and SOFTNET from Software Technology Parks India, with their objectives, services and tariff.*
Presents the preparedness of India to join the information superhighway by mentioning the activities of various organisations, grouping them broadly under business, directories, investment, newspapers, online information, religious, tourism, exhibitions/conferences, software products and campaign. Points out the limitations to Internet access in India by way of infrastructure with limitations on leased lines, expensive hourly usage costs due to lack of tie-ups with Internet companies and gauging the popularity of Web sites. Concludes that the booming Indian IT market trend encourages the Internet service providers to expand and Internet awareness is on the rise through various seminars/workshops coupled with live demos. In spite of hurdles, India is gearing up to join the Internet bandwagon not only to reap the benefits but also to make available resources and use the Net effectively in sectors like banking, finance, trade, edutainment, healthcare, etc.

Keywords: Internet, Internet service providers, ERNET, NICNET, GIAS, SOFTNET, Indian experiences

1. Introduction

The Internet is the catch-all word used to describe the loose connection of millions of computers at thousands of sites throughout the world, whose users can share information or computer files with no central location or administration of the system. It is a logical, global metanetwork with a virtual information store, arising out of the best instance of a cooperative movement; it transcends political boundaries and is a global arena for hack-ticks. There are companies that help manage different parts of the networks that tie everything together. The networks within different countries are being funded and managed locally according to local policies. Access to the Internet usually means that one has access to a number of services such as electronic mail, listservrs, archive servers, netnews, FTP, telnet, gopher, WAIS, WWW and Web authoring. Around the world people make information available and are responsible for the documents they write and make public on the Web. The five areas in which Internet applications would have an impact are sales and marketing, human resources, customer services, engineering/research and development, and financial.

2. Internet service providers in India

The Internet facility, once available only to government, academic and research communities, is now accessible to anyone who has the time and passion for information. The early networks were mainly based on terrestrial lines whereas the recent ones are in satellite mode. The major Internet service providers in India are ERNET (based on terrestrial lines and VSATs), NICNET (mainly satellite based), GIAS (based on terrestrial lines and satellite) and SOFTNET (mainly satellite based).

2.1. Education and Research Network (ERNET)

The ERNET was initiated in November 1986, with the financial assistance of Rs. 10 crore (US $3 million) from the the Government of India and US $6 million from the United Nations Development Programme. It involved eight premier institutions in the country as participating agencies: the five Indian Institutes of Technologies; the Indian Institute of Science, Bangalore; the National Centre for Software Technology (NCST), Mumbai; and the Department of Electronics, New Delhi.

ERNET was the first network in India that provided access to the global Internet. The user base of ERNET has grown to more than 50,000 users in 600 organisations and provides access to about 120 networks in other countries. ERNET offers the whole range of Internet services through the eight backbone nodes at geographically spread locations. The main sites are being interconnected though terrestrial links and the access to the international gateway is presently through a 64 Kbps link. With the successful commissioning of Sat-WAN Hub, ERNET

sites are being accessed progressively through the VSAT network. The network has two overseas gateways situated at NCST, Mumbai and the Software Technology Park (STP), Bangalore that connect ERNET users to global networks. These gateways link to two local networks in the US and are helping Indian scientists log in to an innumerable number of host databanks that are available on Internet.

ERNET offers three types of access options:

(1) access through a dial-up telephone line (local or STD);

(2) access through a leased line;

(3) access through VSAT (Ref 1).

Subscription to ERNET is on a per annum basis: for dial-up access, terminal type or Serial Line Interface Protocol (SLIP)/Point-to-Point (PPP), up to 200 Kbps of mail traffic per day would be Rs. 1 lakh (US $2900). With leased line access, up to 64 Kbps and higher volume of traffic up to 1 Mb per day would be Rs. 2 lakh (US $5700), excluding the leased line charges. The VSAT based link would cost Rs. 2 lakh (excluding the cost of VSAT equipment). E-mail access up to 200 Kbps per day would be Rs. 25000 (US $700) (Ref 2). Some of the future areas of work include test bed for high speed networking and support of applications like multi-site video conferencing, and other integrated services like multimedia mail and multimedia document retrieval by upgrading its bandwidth to 2 Mbps. The network hopes to serve 10,000 institutions by 1997.

2.2. National Informatics Network (NICNET)

NICNET is one of the extensive nationwide networks that is mainly dependent upon the satellite based data communication of the National Informatics Centre, which is exclusively for government organisations and in operation since 1988. It consists of a master Earth station connected to a host computer at New Delhi. The micro Earth stations — around 700 — are being located at all regional, state, district centres and selected commercial centres, hence providing widest reach in the country (Ref 3).

NICNET maintains its leading edge with the incorporation of a powerful Ku-band based National Information Highway as an overlay network on the existing SSMA/CDMA architecture (comprising VSAT links operating at 1200 bps to 9600 bps). This overlay network is established in 14 cities and is being extended to 70 cities with the central hub at New Delhi. It supports high speed communications up to 2 Mbps. It is being connected to over 200 international networks in 160 countries and has dedicated Internet access through a direct high speed link to Sprintnet, US. The National Information Highway allows its users multimedia Internet access for electronic commerce, distance education, research document support, distributed geographic information system, a legal information system and medical databases among others, worldwide. NICNET established the first WWW server in India: the BASIS Web Server in collaboration with Information Dimensions Inc. added a new dimension to the existing EDI services and bibliographic services on NICNET (Ref 4). NICNET provides Internet access in three ways:

(1) mail only access;

(2) shell account — dial-up terminal access;

(3) SLIP/PPP — on-demand direct access.

The user base of NICNET, apart from the government organisations, is around 2000 and NICNET hopes to raise it to 10,000 by the year end.

2.3. Gateway Internet Access Service (GIAS)

Videsh Sanchar Nigam Limited (VSNL), India's international telecom carrier, has provided full-featured Internet service from its GIAS since 15 August 1995 by connecting its main Internet access node at Mumbai to the Internet node in the US through satellite media and to Europe through submarine cables. It has remote Internet access nodes at Calcutta, Madras, New Delhi, Pune and Bangalore and these are being connected to the Mumbai node through the Department of Telecom's (DOT) inter-city links. The GIAS gives users a full Internet access through a normal telecom services. The user base of VSNL is around 12,000 which includes individual, corporate, and educational institutions.

VSNL provides a platform for the service and offers three types of accounts: (i) Student accounts, (ii) shell accounts and (iii) TCP/IP accounts. Further, VSNL has enriched the services to enable users to create their home pages to make public on the Net, thus enabling Indian companies to be visible worldwide in the cyberspace. VSNL has fixed the tariff on per annum basis and Rs. 5000 (US $150) for 250 hours of usage for individuals using the shell account with dial-up access. For TCP/IP access the tariff is Rs. 15000 (US $450). The tariff for commercial organisations is Rs. 25000 (US $750) for both types of access. For leased line access, the tariff varies from Rs. 1.5 lakh (US $4300) for commercial organisations using 2.4 Kbps to Rs. 25 lakh (US $72000) at 128 Kbps. For students the special tariff is Rs. 500 (US $15) (Ref 5).

All the Indian Internet service providers — ERNET, NICNET and VSNL — are accessing the Internet through the single gateway provided by VSNL. To expand VSNL's Internet operations, it has plans to have a nationwide backbone for smooth flow of denser traffic by enhancing the bandwidth to 2 Mbps and making India a regional hub of connectivity for Asia by linking to Singnet, a Singapore based ISP. It expects a 1 million user base by the turn of the century (Ref 6).

popularity with major companies opting for advertising on it;

(5) *Made in India*: a Web site from the Mumbai based ad agency Folklore Communication Management Services Ltd, started Internet advertising and dedicated to exporters of products and services from India, providing them with opportunities for online advertisement and promotions;

(6) Connect! India: launched by Elnet Technologies, Madras with the Web site at Virginia. It is a virtual business mall on the WWW, dedicated exclusively to Indian business. Every client on this mall is provided with a host of services ranging from design, creation and hosting of home pages, taking care of publicity, feedback, registration of address and search tools;

(7) *Sabre Opportune*: launched during February 1996 by Strategic Advantage for Brand Equity, a Bangalore based advertising agency advertising its services on the Internet, targeted for the organisations interested in India as a market. It provides an overview of India as a marketplace, the category of product or service profiles of the intended customers and recommend possible niches;

(8) *Info-Shop*: floated by The Jobnet Ltd, Bangalore during April 1996 to shorten the distance between searching and finding jobs, limiting the need to go through the classified columns. Jobnet would cover all kinds of jobs on offer and intends going to the US too, apart from South East Asia;

(9) *India Trade (http://www.indiatrade.com/cerc)*: the Consumer Education and Research Centre, in collaboration with its Atlanta associate, publishes a business magazine *India Trade*.

3.2. Directories

The directories that are available on the Internet include:

(1) *SICOD'96*: the first Indian commercial directory, *Southern India Commercial Directory '96* from Metro Information Services Pvt Ltd., Madras lists more than 12,000 companies in South India with essential information on the company and its products (Ref 8);

(2) *Exporter's Directory (http://www.leatherindia.com)*: from the Council for Leather Exports, Madras to host electronic exporters of Indian leather and leather products directory on the Web. One listing would contain the company profile, its products and other basic details and the other would have home pages for whole product catalogues.

3.3. Investment

The following Web sites cover investment related information.

(1) *Reserve Bank of India (htpp:www.indiaworld.com/home/rbi)*: RBI has reserved three home pages on the Internet for disseminating banking and foreign exchange information;

(2) *Business Information Services Network (BISNET)*: the Federation of Indian Chambers of Commerce and Industry is going on the Internet with a huge database on the Indian economy and business, with daily updating and allowing the browser to go through the 150,000 pages;

(3) *IPAnet*: launched on 15 March by Multilateral Investment Guarantee Agency (MIGA), the World Bank's insurance arm. This electronic investment mall contains global databases on foreign investment conditions, from the mining laws prevalent in each country to the investment codes to the business operating conditions. MIGA plans to open IPAnet free of cost for six months and later on will be pricing at US $15 per month;

(4) *National Stock Exchange (NSE)*, Mumbai is being prepared to go live on the Net to aid investors, especially NRIs for placing orders while keeping a tab on real time stock prices;

(5) *Securities and Exchange Board of India (SEBI)*, Mumbai will be going online in three months with a home page of its own, aiming to bundle all its regulations backed up with regular updates, data on changes and events in the capital markets and annual reports (Ref 9);

(6) *EEPC site (http://www.eepcnet.com)*: the Engineering Export Promotion Council has plans to provide information about the Indian engineering export community on trade statistics, market intelligence, joint ventures and international regulations.

3.4. Newspapers

The three Indian news papers that are available on Internet are:

(1) *The Hindu*: *The Hindu*, one of the national newspapers went online on the Internet as the *Hindu Online* (HOL) to cater for the needs of overseas readers during April 1995 and became a weekly edition from the first week of June 1995. About 350 items of news/articles/features along with images, classified under 30 categories posted on a server in the US with the cooperation of Paralogic Corporation. The site received its first recognition as one of the Top Five Percent sites by Point Communications Inc. A daily service with the cooperation of the India Information Inc. was launched on 1 October 1995 on a different server, Indiaserver in New York. This site provides news briefs and business and investment related information, and bagged the Gold Tiger Award given by Worldclass.

2.4. SOFTNET

Set up by the Software Technology Parks of India (STPI), in association with SatComm Services India, the just-started SOFTNET promises maximum up-time and robust access to software exporters to communicate with their overseas clients without going through VSNL. All connectivity to access points is through radio links that are very reliable. It offers high speed data communication links and direct Internet access. Each of the six STPs at Noida, Bangalore, Bhubaneshwar, Hyderabad, Tiruvananthapuram and Gandhinagar has an international gateway.

Softnet offers three types of services:

(1) SoftPoint, a dedicated leased line service ranging from 9.6 Kbps to 2 Mbps offers interactive applications, video conferencing and large business operations with specific clients or offices abroad;

(2) SoftLink, a shared Internet service using TCP/IP and designed to provide both the IP routing service as well as server-based access with facility for virtual hosting;

(3) SoftPack, an X.25 based packet switching network service that allows users to access other international public data networks.

Services like video-on-demand, bandwidth on demand and other value added services viz., authoring of Web pages and setting up Web servers for providing single point service are on the way (Ref 7).

SOFTNET tariff is on a per annum basis. For dial-up mode, SLIP/PPP (packet billing), V.34 modems, 16-32 lines would be Rs. 26000 (US $750) plus Rs. 150 (US $5) per Kilo segment (64 K Bytes). For dial-up access, flat fee billing, V.34 modems, 16-32 lines would be Rs. 4 lakh (US $11500). The radio link 64 Kbps access would be Rs. 5 lakh (US $14300) per 64 Kbps plus radio link charges Rs. 1 lakh (US $3000). The LAN access within STP complexes would be Rs. 4 lakh with 64 Kbps (Ref 2). With the basic network in place, next on the agenda are plans to upgrade the level of bandwidth radiated from the Earth station for SoftPoint and SoftLink services to 2048 Kbps for the US, 1408 Kbps for European countries and 256 Kbps for Asia Pacific.

2.5. Corporate agencies

Apart from the four government funded ISPs, two more are on the way from corporate agencies, viz.:

(1) *InterNet India*: a dial-up Internet service launched by J.H. Communication Pvt Ltd., Hyderabad in May 1996, targeted at corporate clients for their high speed and reliable Internet access, with working cost of less than one rupee (US $0.02) per kilobyte of data transfer;

(2) *Computer Maintenance Corporation Limited*: the CMC Limited has tied up with VSNL and Pritish Nandy Communications to provide Internet access, both in India and abroad, to establish and run Internet sites and 'Cybercity' at Mumbai. These sites would provide news and an interactive databank of corporate information, besides offering information on India's culture, heritage, education and entertainment.

3. Indian experiences

The Web sites that came up have originated mainly from corporate agencies, with servers located in US. Several others are in the pipe line. The ones that are from government agencies are mainly focusing on the investment, tourism and edutainment. The Web sites are broadly grouped under Business, Directories, Investment, Newspapers, Online Information, Religious, Tourism, Exhibitions/Conferences, Software Products, and Campaign.

3.1. Business

Following are some of the Web sites that cover business information on their servers.

(1) *IndiaWorld (http://www.indiaworld.com/rdc)*: the first Web site launched in March 1995, from Ravi Database Consultants Pvt Ltd., Mumbai with Indian interests along with ASAP Solutions Inc., US. It offers a range of news and information, business, finance and technology from magazines such as *India Today*, *Business India* and *Express Investment Week*. One year's subscription to IndiaWorld costs Rs. 700 (US $20);

(2) *Rediff on the Net*: the first interactive online service on the Internet from India launched by Rediff Communications during February 1996. The server was housed at Mumbai and has a mirror site at California. It covers a wide range of domestic and international topics such as current events and news, business information, personal investment guidance, films and entertainment information, travel and leisure tips, sports coverage, specialised sections for students and children, and a comprehensive archival database. The subscription charge for the free to view area is Rs. 1600 (US $45) per annum and for the complete service is Rs. 4800 (US $140) per annum;

(3) *G On Line (http://www.chitralekha.com)*: the first online film magazine from Chitralekha Group, Mumbai launched in January 1996, targeting the NRIs. The site offers films, finance, politics, some free services, additional information with subscription; pay per use service and advertising;

(4) *Gateway of India*: launched by Sound Electronics, Mumbai to install the pages on the Net and gained

- *Hindu Online*: http://www.webpage.com/hindu/index.html;
- *The Hindu*: http://www.indiaserver.com/news/thehindu/thehindu.html;
- *Business Line*: http://www.indiaserver.com/news/bline/bline.html.

(2) *Indian Express (http://express.indiaworld.com)*: *Indian Express* was one of the nine sites on the Internet that offered news about Parliamentary elections in India during April 1966. Over one million hits made and about 300,000 documents downloaded by NRIs from 75 countries at the Express India World Election site, which launched when the polls began. On the Net, the election site divided into three categories: national results with analysis and graphics; a state-wise result chart with background and graphs; and a constituency-wise chart. The group has plans to launch its publications *Indian Express* and *Financial Express* on the Net;

(3) *The Economic Times (http://www.economictimes.com)*: one of the sites that offers detailed financial and corporate information from Bennett, Coleman & Co., Ltd., Mumbai.

3.5. Online information

The sites that offer information through online include:

(1) *Medical*: the medical library at the Malpani Nursing Home, Mumbai extensively searches the Paper Chase Library (*http://www.pch.bih.harvard.edu*) on the Internet. To make it more economical the library has tied up with Beth Israel Hospital, Harvard to provide access to the Cyber library for Indian doctors by doling out passwords for a non-profit fee Rs. 2000 (US $60) (Ref 10);

(2) *ERL Technology*: Global Informations Systems Technology Ltd., (GIST), New Delhi has unleashed Electronic Reference Library (ERL) technology in India, from SilverPlatter Inc.;

(3) *Indian Union Budget (http://www.nic.in/indiabudget)*: for the first time the union budget for 1996-97 was made available covering economic survey, budget at a glance, highlights, speech, customs and central excise notifications and annual financial statement.

3.6. Religious

The sites that cover Indian religion are:

(1) *Bhagavad Gita*: The Centre for Development of Advanced Computing, Pune has undertaken a project 'Dnyaneshwari', the famous treatise on the Bhagavad Gita. The volume of work would be around two million characters and translated into English for making public over the WWW (Ref 11);

(2) *Ramakrishna Mission (http://www.daistech.com/rkmission)*: DAIS Infotech hosted a Web page for Ramakrishna Mission, the socio-religious organisation, covering its origin, various centres, activities and services, with 'Belur Math' as its focal point.

3.7. Tourism

The Web sites that cover tourism information include:

(1) *Mumbai on the Net*: provides up-to-date and authentic information about Mumbai city. It was launched on 22 May 1996, sponsored by the Maharashtra Tourism Development Corporation;

(2) *Gujarat*: the Tourism Corporation of Gujarat Ltd. is to woo domestic and international tourists by providing general information, pictures, and details of places of historical and cultural importance of Gujarat by setting up a home page on the 'Royal Oriental Express' (Ref 12).

3.8. Exhibitions/conferences

The Web sites that held exhibitions/conferences include:

(1) *NASSCOM'96 (http://www.nasscom.net.in)*: the National Association of Software and Service Companies launched the first live server on the Internet from India to cybercast the Nasscom'96 conference and exhibition organised in Mumbai during 7-10 February 1996, and provided updated information on the conference and exhibition;

(2) *PCL Mindware* is gearing up to launch a 'virtual art gallery' to surf across the Internet with more than 1000 paintings and the entire range of Indian music, and functions as an Internet designer to assist Indian corporates in hosting their home pages on the Web. It also caters in the areas of corporate presentations, edutainments, kiosks and computer based trainers on the multimedia front.

3.9. Software products

The Web sites hosting the software products include:

(1) *CAD Products*: the Madras based California Software Ltd launched its CAD suite of products on the Internet for distribution. These include a set of application programming interfaces for developers of CAD applications, a custom control to view drawings (created in AutoCAD) that could be embedded in office documents such as Word and Excel and presentation tools like Power Point, and an enterprise

management system for fuel oil bunkering;

(2) *Fact*: The Internet version of an accounting applications software from Vedika Software, Calcutta. Its Internet server version would sit on an Internet server anywhere in the world and the client front end interface would be able to access the package on the server, and yet register transactions and pull out end use data as if from a local site. The company accesses the WWW through leased lines of the Internet Research and Development Unit of the National University of Singapore and has an interactive home page (Ref 13);

(3) *Millennium Masala*: an electronic magazine on the Internet focused on young professional NRIs in North America and UK by Millennium Cyberworks. Masala offers Indian themes and addresses the Indian market with Internet solutions while offering Internet development skills to the Indian workforce in creating and marketing their Web sites. To assist Indian businesses it has created SAFFORN (South Asian Firms, Finance and Realty Online), a virtual trade show and directory on the Web for Indian export houses, financial institutions, real-estate developers and individuals to reach western buyers, partners, investors and employers.

3.10. Campaign

The following groups are devoted to campaigning for the Internet:

(1) *India Internet Java Users Group (IIJUG)*: formed after the release of Java during December 1995 to campaign intensively for the cause of Java by way of seminars, training programmes and interactive demos; to demonstrate the power of Java programming tools and techniques; to serve as the world's first Java Resource Centre; to interact with Java users the world over; and to keep Indian IT professionals up-to-date with application development techniques (Ref 14);

(2) *Silicon Graphics India*: hosting a series of seminars in India to highlight its strengths in the Internet and with Netscape Communications to educate users about the Internet, and the latest Web authoring and serving techniques;

(3) *Cyberskool*: a high-tech multimedia computer lab 'Cyberskool' with Internet access was supported by Intel's Corporation at the National Science Centre, New Delhi;

(4) *Cyberclub*: India's first Cyber Cafe that started during 1995 at Maurya Sheraton, New Delhi evolved into a serious Cyberclub. Individual membership costs Rs. 30000 (US $900) and a corporate membership Rs. 50000 (US $1500) annually, with browsing hours limited to seven hours a week.

4. Limitations

The Internet, though a very common thing in the West, has to clear quite a few hurdles before the average Indian can don the internauting cyber suit. Existing limitations include:

(1) *the infrastructure*: India has one of the lowest telephone penetrations in the world with 1.3 per 100 as compared to the world average of 11 telephones per 100. Currently Internet access is only through VSNL. Though the private companies get the nod to provide access, they have to rely on VSNL for the backend. As access is through telephone lines, there is need for a higher telecom efficiency than India currently has;

(2) *costs*: VSNL currently offers shell and TCP/IP accounts. The costs are high even for corporates and it works out to be around Rs. 100 (US $3) an hour plus the STD call charges where the subscriber does not have direct access to a local node.

These limitations have certain implications on advertisers in India:

(1) limitations on leased lines in India: downloading of graphics takes a long time and one has to pay for the phone calls due to lack of tie-ups with Internet companies;

(2) Internet marketing and advertising generally converts into a purchase by just punching in the credit card number or by informing the bank. This seems impossible in India as the tendency in the country is still to verify the signature of the credit card holder on the pay slip;

(3) for the advertiser, gauging the Web site's popularity based on the number of hits could be misleading. However, this problem is not just limited to India but cuts across the Internet spectrum across the world.

5. Conclusion

The IT industry in India during 1995 showed a compounded growth rate of 50% (over Rs. 6000 crore, equal to US $1.7 billions) with 300,000 PCs installed (60% growth rate), applications software segment 100% and peripherals with 400%. Reduction of import duty on software to 10% and on computers and peripherals to 40% encourages the SOHO and home markets to pick up soon. The financial institutions and the banking sector are the current areas of adoption of IT in India. The launch of an Internet service by VSNL during August 1995

attracted much enthusiasm and reminded of the need to gear the telecom infrastructure to address the needs of the volume of traffic and transactions that are needed for commerce over the Net. The DOT claims that the backbone is in place: 80% of the main trunk lines are already fibre that link the country's major cities with 140 Mb, to expand to 500 Mb. The privatisation of basic telecom policy by the government also allows many corporate organisations to jump into the Internet arena for healthy competition. Awareness about the Internet is on the rise is the past year through various workshops, coupled with live demos spanning from one day to three day programmes by academic and commercial organisations, held on average once a month throughout the country. In spite of hurdles, India is gearing up to join the Internet bandwagon, not only to reap the benefits but also to make available resources on the Net. India could also effectively use this information highway in sectors like banking, finance, trade, edutainment, healthcare and so on.

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